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(56) Documents Cited
GB 2287418 A **GB 2136278 A** **US 4345353 A**
US 3792569 A

(58) Field of Search
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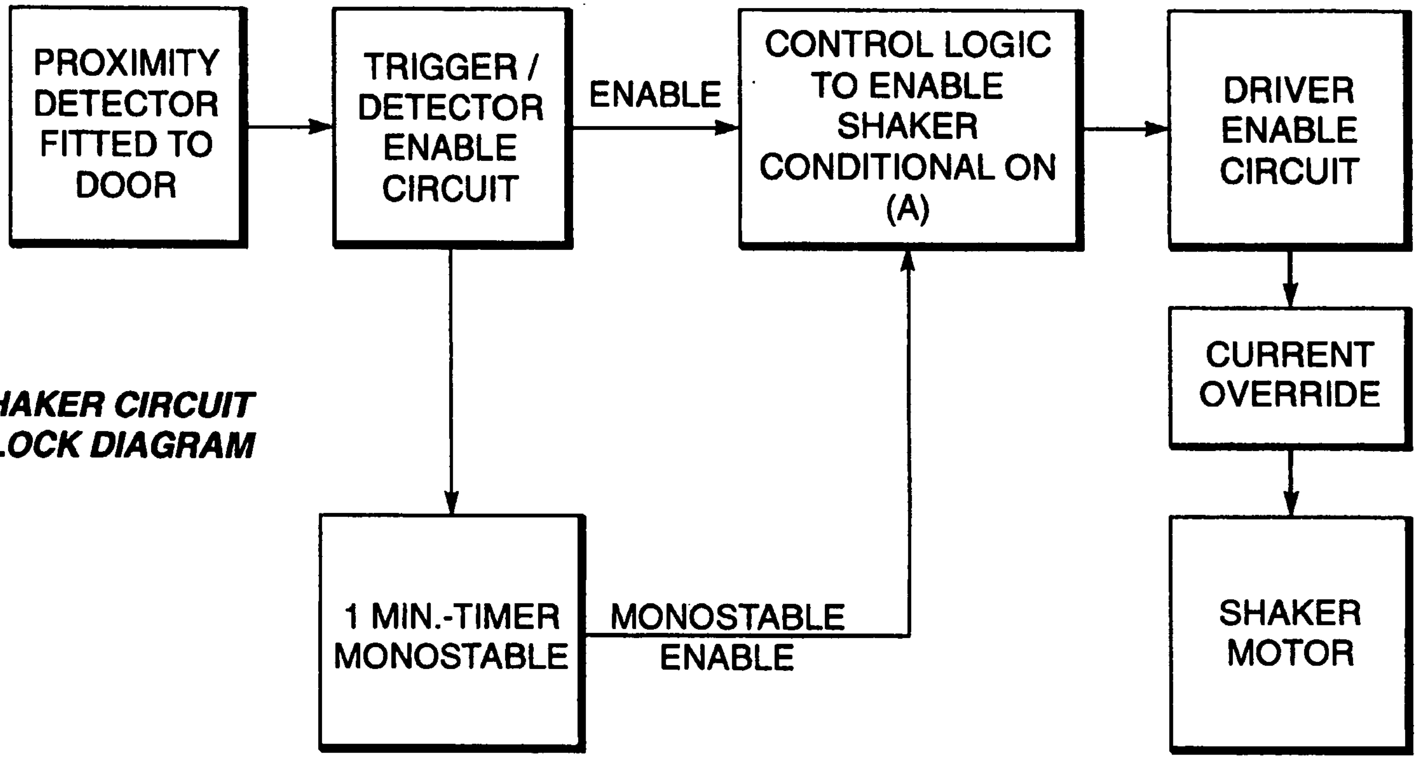
INT CL^6 **A47L 9/20, E01H 1/08**

(54) Cleaning filter of a suction sweeping machine

(57) A Pedestrian operable suction sweeping machine such as disclosed in GB-A-2287418A has a shaker mechanism for shaking fines off the filter arrangement for subsequent removal from the machine. The door to the filter compartment is fitted with a switch which controls the shaker mechanism, so that an electric motor driving an offset weight can only operate when the door is closed.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date within the period prescribed by Rule 25(1) of the Patents Rules 1995


PROXIMITY DETECTOR FITTED TO DOOR
TRIGGER / DETECTOR ENABLE CIRCUIT
ENABLE
CONTROL LOGIC TO ENABLE SHAKER CONDITIONAL ON (A)
DRIVER ENABLE CIRCUIT
CURRENT OVERRIDE
SHAKER MOTOR
1 MIN.-TIMER MONOSTABLE
MONOSTABLE ENABLE

SHAKER CIRCUIT BLOCK DIAGRAM

(A) DOOR CLOSED (AND) TIMER MONOSTABLE ON

(B) SHAKER NOT ENABLED IF EITHER MONOSTABLE TIMER IS OFF OR IF DOOR IS OPEN

(C) SYSTEM INOPERATIVE IF MACHINE MOTOR IS ON

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SUCTION SWEEPING MACHINE

This invention relates to a suction sweeping machine which is designed for picking up debris from streets and other areas, and can be operated by a person walking or riding behind the machine.

Such a machine is the subject of our published U.K. Patent Application No.2287418A. Such machines include rotary brushes and a suction inlet at ground level, through which debris is drawn and then collected in a large capacity refuse bag or sack. The machine is provided with a filter arrangement which allows the air drawn into the machine to be returned to the atmosphere, after any dust and other solids have been filtered from it and deposited in the bag or sack. While such machines work very satisfactorily, they suffer from one disadvantage, which is that in due course, the filter arrangement begins to become clogged with fine dust particles. The present invention seeks to overcome this disadvantage. The invention is particularly suitable for use with a candle filter arrangement as described in our pending U.K. Patent Application No.9521534.9

According to the present invention, we provide a suction sweeping machine including an outer housing, a motor, a fan driven by the motor, a suction head connected by an inlet duct to the fan, whereby debris may be collected from the ground in a fluid stream generated by the fan, be forced by the fan into an outlet duct extending from the fan to a container, and be collected in the container, there being a filter arrangement associated with the housing to collect fines in the fluid stream but allowing filtered air to pass back into the atmosphere adjacent the machine, an access opening closable by a door in a wall of the housing, through which debris collected by the machine may be removed, and a shaker mechanism for shaking fines collected by the filter arrangement off the filter arrangement, for subsequent removal from within the housing, the shaker mechanism being controlled by switch means associated with the door for closing the access opening.

The fluid stream may carry papers, drinks cans, cigarette ends and the like. This bulky debris will collect in the container which may be periodically emptied or removed for disposal. Also, if the machine is provided with water mist dust suppression, the "wet" dust and dirt will remain in the container and may thus be easily and cleanly removed from the machine. Similarly, when the suction sweeping machine passes over a puddle, the water drawn into the machine will be retained in the container and will not result in the machine leaving a trail of dirty water behind it as occurs with conventional machines. A special container may be used in wet weather.

The container may be a rigid or semi-rigid box but is preferably in the form of a plastics bin liner sack or bag, e.g. located within a compartment which provides protection for the bag and improves the appearance of the machine, such that filled bags or sacks may be readily removed, sealed and disposed of, and a supply of replacement bags may be carried on the machine.

Preferably, a porous member in the form of a flexible tube extends between the outlet duct and the container to act as a primary filter. Suitable means may be provided whereby the porous member can be disconnected to assist with removal of said container through said access opening when the container is full, and be replaced by a new one.

In the preferred embodiment, the container is located in a generally rectangular compartment at the rear of the machine, and towards one side thereof, said compartment being defined by generally rigid mesh screens on the side thereof opposite said one side and to the rear thereof, by a generally impervious front wall, and by generally impervious floor and roof walls, and by a door for said access opening. One or more trays for collecting liquid and/or dust may be located in the bottom of the compartment. Preferably also, the sides of the compartment defined by said mesh screens are further defined by filter means which may comprise fine screens of textile material.

Also, in the preferred embodiment, the fine screens preferably comprise a plurality of vertically extending candle filters, the candle filters comprising felt like socks each supported on a skeletal sleeve open at its upper end, the open upper end communicating with the interior of the housing, the sleeves depending from a filter support frame which is preferably suppoted by a spring device on the main frame og the sweeping machine.

Normally, as disclosed in the specification of our Application No.95215349, each skeletal sleeve comprises a spring-like device depending from a cylindrical tube, with the socks being located on the tubes by suitable ties, and being held open along the spring-like device, over which the socks are stretched. According to another aspect of the present invention, we flare the upper ends of the tubes, so that the upper end of each tube is trumpet shaped. This improves the performance of the candle filters by increasing the air flow through the tubes, by up to about 15%.

Preferably, the shaker mechanism is mounted on the filter support frame, and may comprise an electric motor which drives an offset weight. The shaker mechanism may shake just the candle filters, or all the filters defining the walls of the compartment, thus causing dust thereon to be shaken off and deposited in said one or more trays in the bottom of the compartment for subsequent removal.

Preferably, the switch means associated with the door is such that the electric motor will only be activated to operate the shaker mechanism when the door is closed. This can be achieved in known manner, e.g. by having a control device associated with the switch. There may be a time delay device to ensure that once the electric motor operates, it is automatically switched off after a preselected time.

While the shaker could be operated from the machine controls if the motor is off and the door is closed, it is preferred that there be a proximity detector fitted to the door which has to be activated, as well as a timer monostable which must also not be off, before the shaker motor operates. It is preferred that the shaker motor be timed to operate for about one minute. Obviously, the machine must not be in operation when the shaker is in operation, otherwise dust on the filter socks would be held on the socks.

A typical shaker motor circuit block diagram is shown in the accompanying drawing.

If the filters are shaken before the door is opened, this will result in the compartment being filled with airborne dust which would make emptying the container a most unpleasant task. Hence, by shaking the filters after the door has been closed, it means that when the door is next opened to empty or replace the container, the dust in the compartment will have settled into the said one or more trays, and these can be emptied when the container is emptied or replaced.

It will of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

CLAIMS

1. A suction sweeping machine which can be operated by a person walking or riding behind the machine and including an outer housing, a motor, a fan driven by the motor, a suction head connected by an inlet duct to the fan, whereby debris may be collected from the ground in a fluid stream generated by the fan, be forced by the fan into an outlet duct extending from the fan to a container, and be collected in the container, there being a filter arrangement associated with the housing to collect fines in the fluid stream but allowing filtered air to pass back into the atmosphere adjacent the machine, an access opening closable by a door in a wall of the housing, through which debris collected by the machine may be removed, and a shaker mechanism for shaking fines collected by the filter arrangement off the filter arrangement, for subsequent removal from within the housing, the shaker mechanism being controlled by switch means associated with the door for closing the access opening.

2. A suction sweeping machine as claimed in claim 1 wherein the shaker mechanism is mounted on the filter support frame, and comprise an electric motor which drives an offset weight.

3. A suction sweeping machine as claimed in claim 3 wherein the shaker mechanism shake either just the candle filters, or all the filters including those defining the walls of the compartment, thus causing dust thereon to be shaken off and deposited in one or more trays for subsequent removal.

4. A suction sweeping machine as claimed in claim 2 or 3 wherein the switch means associated with the door is such that the electric motor will only be activated to operate the shaker mechanism when the door is closed.

5. A suction sweeping machine as claimed in claim 4 wherein a control device is associated with the switch.

6. A suction sweeping machine as claimed in any one of claims 1-5 wherein there is a time delay device to ensure that once the electric motor operates, it is automatically switched off after a preselected time.

7. A suction sweeping machine as claimed in any one of claims 1-6 wherein a proximity detector is fitted to the door which has to be activated, as well as a timer monostable which must also not be off, before the shaker motor operates.

8. A suction sweeping machine which can be operated by a person walking or riding behind the machine, and substantially as herein before described with reference to the accompanying drawings.

CHARTER MARK

The Patent Office

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Application No:	GB 9612069.6	**Examiner:**	John Fulcher
Claims searched:	1-8	**Date of search:**	29 April 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): A4F(FC,FCCA,FFD,FSCA,FSND,FSNX,FSSB); B1T(TNCB,TNFT); E1G(G81B)

Int Cl (Ed.6): A47L 9/20; E01H 1/08

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2287418 A	(APPLIED SWEEPERS)	1-5
Y	GB 2136278 A	(SCOTT AND FETZER)	1-5
Y	US 4345353 A	(SOMMERFIELD)	1-5
Y	US 3792569 A	(CARLSON)	1-5

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
		E	Patent document published on or after, but with priority date earlier than, the filing date of this application.
&	Member of the same patent family		